

Felix Buechi *et al.*  
Appl. No.: 10/608,088

### REMARKS/ARGUMENTS

#### *Claim Status*

After entry of this Amendment, Claims 1, 3 – 10 and 12 – 23 are pending. By this Amendment, Claims 1, 3 and 10 are amended. No new matter has been added.

#### *Initial Remarks*

In response to Applicants' arguments, the Examiner states that Applicants' arguments have been considered but are moot in view of the new ground of rejection. In the present February 20, 2007 Office Action, the Examiner rejects Claims 1, 3-10 and 12-23 as being anticipated by Vanderborgh (U.S. Patent No. 4,973,530). In the Office Action mailed February 2, 2006, the Examiner rejected Claims 1-23 as being anticipated by Vanderborgh (U.S. Patent No. 4,973,530). In the final Office Action mailed August 9, 2006, the Examiner withdrew the rejection over Vanderborgh. In response to the final Office Action, Applicants filed an RCE and amended independent Claims 1 and 10 to include limitations of Claims 2 and 11, respectively. Applicants are surprised that the Examiner now rejects the so-amended claims as being anticipated by Vanderborgh.

#### *Claim Rejections – 35 U.S.C. § 102*

The Examiner rejects Claims 1, 3-10 and 12-23 under 35 U.S.C. § 102(b) as being anticipated by Vanderborgh (U.S. Patent No. 4,973,530). Hence, the Examiner asserts that Vanderborgh discloses each and every limitation recited in Claims 1, 3-10 and 12-23. Applicants respectfully traverse the rejections over Vanderborgh for the reasons set forth below.

Applicants respectfully submit that Vanderborgh, which is already discussed in the present description on page 2, line 27 to page 3, line 7, fails to disclose each and every limitation of the pending claims, and as such does not anticipate Claims 1, 3-10 and 12-23. However, to expedite examination and allowance of this application, Applicants amend Claims 1 and 10, as set forth in the above listing of claims.

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**Vanderborgh fails to disclose charging a fluid flowing into an anode/cathode area with extracted humidity**

Amongst other assertions, the Examiner asserts that Vanderborgh discloses "exchanging humidity from humidified oxidant and humidified cooling flow on the cathode side through regions 97 and 95 through membranes 109, 102 and 108 into the fluid flowing in regions 117 and 110 of the anodes side." Claims 1 and 10 define that humidity is extracted from a fluid flowing from the anode or cathode area, and that a fluid flowing into the anode or cathode area is charged with said humidity. In Vanderborgh, a fluid flows from the anode area into a region at the membrane 109, and a fluid flows from a region at the membrane 108 into the cathode area. As shown in Fig. 5, the membranes 108, 109 are spaced apart from each other, whereas water removal occurs at the membrane 108 and humidification occurs at the membrane 109. Removed water is transported away via the outlet 114 for a dry gas, but is not used to charge a fluid flowing into the anode or cathode area "with said humidity."

For that reason alone, Applicants respectfully submit that Vanderborgh does not disclose or suggest each and every limitation recited in independent Claims 1 and 10.

In fact, Vanderborgh teaches the use of four fluids, whereas one is used for humidification (inlet 106, outlet 107) and one for water removal (inlet 116, outlet 114). In contrast, the claimed invention uses humidity extracted from a fluid to charge another fluid with the extracted fluid is not at all suggested in Vanderborgh.

In this regard, the present description explains that the claimed method and system are advantageous because humidity is removed from the fluid flow expelled from the cathode area and is added to the fluid flow which flows into the cathode area so that a simple humidity circuit is produced which can be achieved without any greater construction effort and in particular does not require any further external gas or water circuits, as is the case in the above-cited prior art. (Page 3, lines 21 - 26. Emphasis added) Further, excess humidity can be expelled to the outside with the outflowing fluid. (Page 3, lines 28 - 29.)

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**Vanderborgh fails to disclose routing fluids along a pervious membrane to exchange humidity between the fluids**

Vanderborgh teaches to regulate the humidity content in a fuel cell membrane by continuous addition of externally supplied water into the anode area and by continuous removal of humidity on the cathode side. Fig. 5 shows a fuel cell 80 that has a humidification-cooling volume 97 and a water transport volume 117. Water flows into the humidification-cooling volume 97 through port 106 and exits through port 107. (Col. 8, lines 53 – 55.) For the addition of water a water transport membrane 109 is arranged next to the membrane 102 of the fuel cell. A water removal membrane 108 removes humidity from the cathode area with the same zigzag routing arrangement. Dry gas routed over the water removal membrane 108 absorbs the humidity to be discharged, and expels it to the outside.

Therefore, Vanderborgh teaches separate membranes, i.e., one membrane 109 for adding water, and one membrane 108 for removing water. This is contrary to the claimed invention where the exchange of humidity occurs via one pervious membrane. Accordingly, Vanderborgh fails to disclose or suggest, as defined in amended Claim 1, that the first fluid is routed along a first side of a membrane pervious to humidity, and that the second fluid is routed along a second side of the pervious membrane, the second side being opposite to the first side, such that the humidity is exchanged between the first fluid and the second fluid via the pervious membrane.

Likewise, as to independent Claim 10, Vanderborgh fails to disclose or suggest a fuel cell having an exchanger configured to provide fluid humidification by extracting humidity from fluid flowing from one of the anode and cathode areas, and charging fluid flowing into the one of the anode and cathode areas with the humidity, wherein the humidity exchanger has a humidifying and dehumidifying zone separated by a humidity pervious membrane, and wherein the inflow line is positioned in the humidifying zone and the outflow line is positioned in the dehumidifying zone.

In view of the foregoing, Applicants respectfully submit that Vanderborgh does not disclose or suggest each and every limitation recited in Claim 1, as amended, and, consequently, does not anticipate the subject matter of amended Claim 1. Applicants

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respectfully request the Examiner to reconsider the rejections under 35 U.S.C. § 102(b) and to pass Claim 1, as amended, to allowance.

Claims 3 – 9 depend from Claim 1, as amended. For this reason and because of the additional features recited in the dependent claims, Applicants respectfully submit that Vanderborgh does not anticipate Claims 3 – 9. Applicants respectfully request the Examiner to pass Claims 2 – 9 to allowance.

As to amended independent Claim 10 and Claims 12 – 23, which depend from Claim 10, the above reasons regarding Claims 1, 3 – 9 are repeated herewith. For these reasons, Applicants respectfully request the Examiner to reconsider the rejections under 35 U.S.C. § 102(b) and to pass Claims 10, and 12 – 23 to allowance.

#### Conclusion

The present response is intended to correspond with the Revised Amendment Format. Should any part of the present response not be in full compliance with the requirements of the Revised Amendment Format, the Examiner is asked to contact the undersigned for immediate correction.


For the above reasons, Applicants respectfully submit that the application is in condition for allowance, and such allowance is herewith respectfully requested.

Nevertheless, if any undeveloped issues remain or if any issues require clarification, the Examiner is respectfully requested to call Applicants' attorney in order to resolve such issues promptly.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 502464 referencing attorney docket number 2003P09049US.

Respectfully submitted,

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